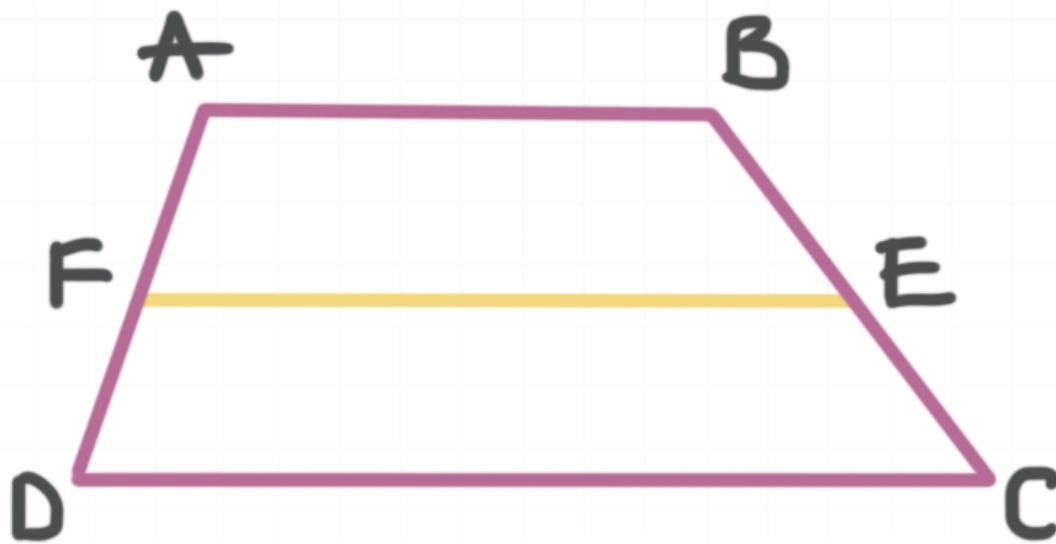


Midsegments of trapezoids

The midsegment of a trapezoid is a segment that connects the midpoints of the two non-parallel sides of a trapezoid.

If $\overline{AB} \parallel \overline{DC}$, if F is the midpoint of $\overline{AD}$, and if E is the midpoint of $\overline{BC}$, then $\overline{FE}$ is the midsegment of the trapezoid.



The relationship between the length of the midsegment and the lengths of the parallel sides is

$$FE = \frac{1}{2}(AB + DC)$$

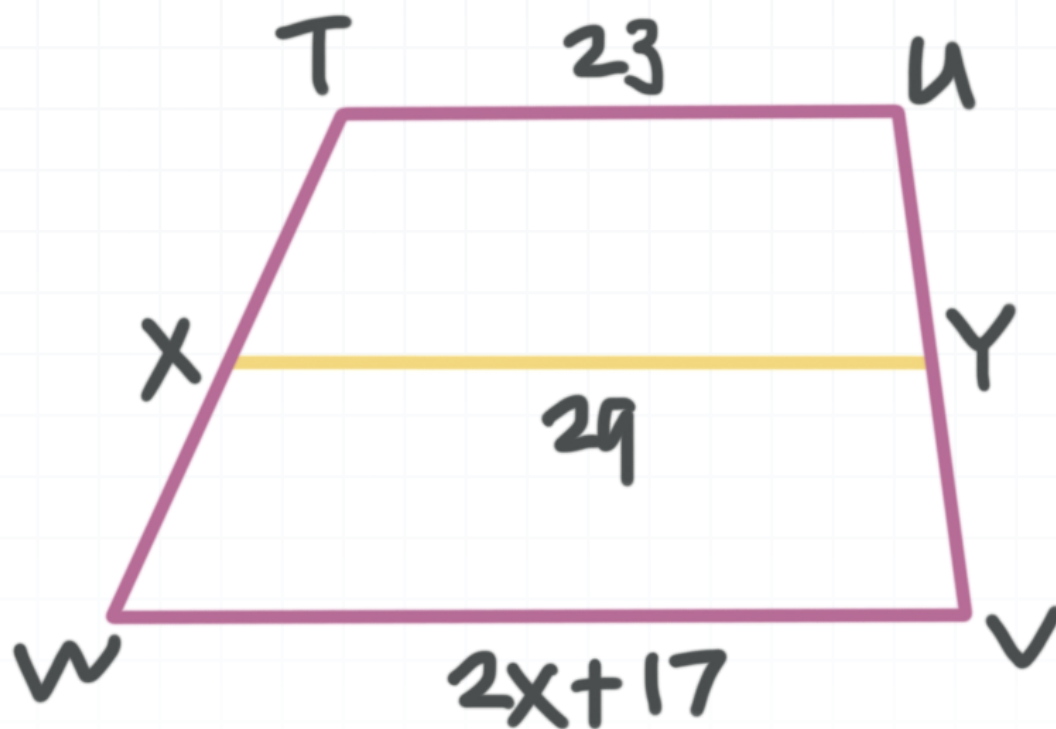
The length of the midsegment of a trapezoid is always equal to half of the sum of the lengths of the parallel sides.

Let's work through a couple of examples.

Example



In the trapezoid pictured, $\overline{TU} \parallel \overline{WV}$, X is the midpoint of $\overline{TW}$, and Y is the midpoint of $\overline{UV}$. What is the length of $\overline{WV}$?



By definition, $\overline{XY}$ is the midsegment of the trapezoid. Therefore, we know that

$$XY = \frac{1}{2}(TU + WV)$$

Let's plug in what we know and then solve for x .

$$29 = \frac{1}{2}(23 + 2x + 17)$$

$$29 = \frac{1}{2}(40 + 2x)$$

$$29 = 20 + x$$

$$9 = x$$



Then the length of $\overline{WV}$ is

$$WV = 2x + 17$$

$$WV = 2(9) + 17$$

$$WV = 35$$

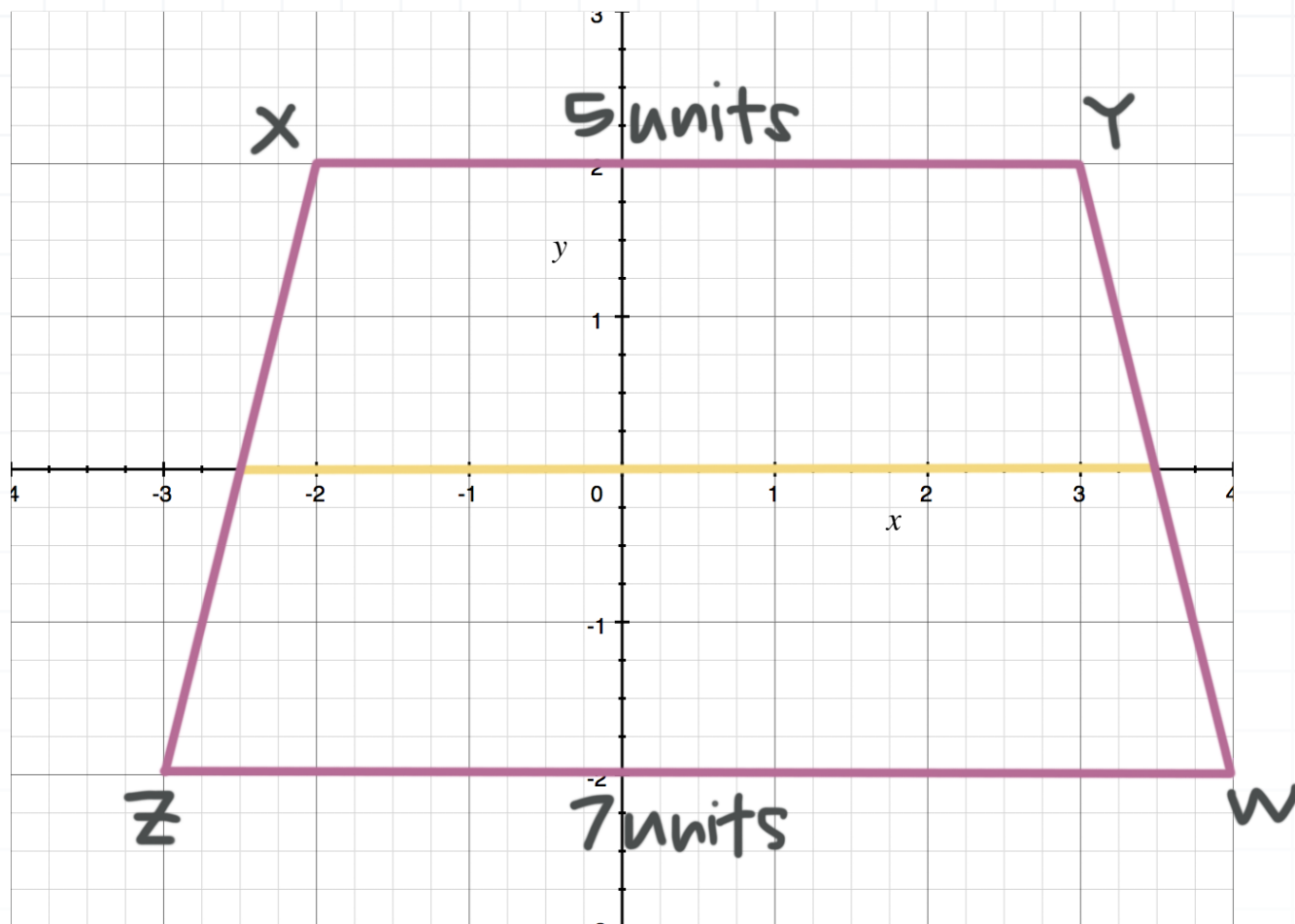
Let's try one with a few more steps.

Example

In the coordinate plane, a trapezoid $XYWZ$ has vertices at $X = (-2, 2)$, $Y = (3, 2)$, $Z = (-3, -2)$, and $W = (4, -2)$. What is the length of the midsegment along the x -axis?

You can plot the trapezoid and find the lengths of the parallel sides.





Remember the length of the midsegment is equal to half of the sum of the parallel sides, so the length of the midsegment is

$$\frac{1}{2}(XY + ZW)$$

$$\frac{1}{2}(5 + 7)$$

$$\frac{1}{2}(12)$$

$$6$$

